

BEHAVIOURAL OBSERVATIONS ON AN UNNAMED SPECIES OF SKINK *LIOPHOLIS* (FORMERLY *EGERNIA*) "CAPE RANGE" FROM CAPE RANGE

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INTRODUCTION

Social behaviour, in which individuals of a species form a cohesive group and interact with each other over extended periods, is rare among reptiles. Among Australian skink lizards until recently assigned to the genus *Egernia*, however, such social behaviour is commonplace and well-documented (Hutchinson 1993). In many species, the social unit is a family group consisting of adults and young animals of one or more age cohorts, but the nature of interactions within such units is not well-known. From late 2004, the opportunity arose to observe social behaviour in a captive breeding colony of what was then an undescribed species similar to *Egernia inornata*, and this paper presents the results of these observations. In a revision of *Egernia*, *E. inornata* has been placed in the genus *Liopholis* (Gardner *et al.* 2008), and the undescribed species is referred to here as *Liopholis* "Cape Range".

ORIGIN OF STUDY ANIMALS

The study animals were collected in October 2004 on the Learmonth Air Weapons Range

on the North West Cape (*ca.* 22°30'S, 113°45'E). The collection was carried out as part of an inventory fauna survey being conducted for the Department of Defence under a Licence to Collect Fauna for Scientific Purposes, and in 2009/2010 the specimens were maintained in captivity under SF006843, issued by the Department of Environment and Conservation.

Six specimens were caught from two locations in pitfall and funnel traps set along drift-fences in open shrubland and hummock (*spinifex*) grassland on shallow red sand over limestone. The six specimens were kept because they were initially thought to represent a major range extension for *E. inornata*, and two of these were lodged with the WA Museum. The remaining four specimens, three from one location and one from a different location, were kept under observation when it was noted that a female was pregnant (members of the group are viviparous).

CAPTIVE HOUSING

The captive specimens were initially maintained in a 60cm

vivarium on red sand taken from their collection location. The colony was moved to a 90cm vivarium in April 2009. They had continuous access to a "hot-rock", a shelter that simulated a burrow (two shelters provided from April 2009), water *ad libitum*, and were fed several times a week on commercial cat food (chicken), finely chopped apple and live food (termites, small crickets and small wood roaches). The vivarium was lit with a "repti-glow" light for approximately 10 hours a day. Heating and lighting were not varied over the year, but the artificial period of lighting was shorter than the summer daylength, so the lizards did experience seasonal variation in photoperiod. They also experienced seasonal variation in ambient temperature, with this varying from 22° to 30° C in summer and 16° to 20° C in winter.

DESCRIPTIONS OF CAPTIVE SPECIMENS AND BREEDING

Three specimens, collected on 8th to 10th October 2004, were still alive in March 2010. The fourth specimen died in April 2005 from injuries received during fighting. It is believed this specimen (a male) was from a different colony and was not accepted by the other animals. Based on subsequent observations on captive-bred animals, the three surviving specimens were adults (one male, two

females) at the time of collection and three or more years old. They displayed no growth in captivity: the male (lizard #1) had a SVL of 62mm in October 2004 and in February 2010. The two females (lizard #2 and #3) had SVLs of 56 and 57mm in October 2004 and February 2010.

From 2005 to July 2011, breeding occurred in January of 2005, 2008, 2009, 2010 and 2011. Mating and courtship behaviour were never observed. Breeding events were as follows:

January 2005. Wild-caught female (lizard #2), probably pregnant when collected, produced two young. One of these found dead in July. Second specimen (lizard #5) survived and still alive in March 2011. Gestation was approximately 10 to 12 weeks.

16th January 2008. Lizard #5 produced two young when just under three years of age. Therefore, sexual maturity in third year of life. She had an SVL of 56mm and has displayed little subsequent growth. When measured at the age of 15 months (April 2009), these two young had SVLs of 41mm and 44mm.

4th and 14th January 2009. Lizard #5 produced two young; her second brood. When measured at the age of three months, these young had SVLs of 30 and 36mm. At the age of 13 months, the larger of these had an SVL of 47mm.

12th January 2010. Lizard #5 produced one young, although it

is suspected that a second young was born and eaten. At this time there were four adults and four juveniles (one or two years old) in the colony. The colony was subsequently divided into separate vivaria, with Lizard #1 (wild caught male), lizard #2 (wild caught female) and lizard #5 (captive born female) in one enclosure, and Lizard #4 (wild caught male) and the surviving young of lizard #5 in the other enclosure.

3rd January 2011. Lizard #5 produced one young.

In summary, the wild-caught female, pregnant at the time of collection, produced two young

but did not breed again. Her captive-bred daughter bred for the first time at the end of her third year, and bred each year subsequently, bearing either one or two young on each occasion. The father is lizard #1, the surviving wild-caught male.

Measurements indicate that adult males are slightly larger than females. They are also slightly brighter in colour. Young animals are also brighter in colour than adults, being orange with a distinctly dark cap, compared with the tawny and more uniformly-coloured adults (see Figure 1). This distinctive juvenile colouration fades by the



Figure 1. Juvenile *Liopholis* sp. "Cape Range" raising its forequarters in an agonistic display towards an approaching adult.

age of one year. Little or no growth occurs after sexual maturity is reached (at the end of the third year of life for one female). The three wild caught animals were adult-sized when collected so were presumably at least three years old. They therefore had a minimum age of 11 years by July 2011 and showed no signs of senescence.

OBSERVATIONS ON SOCIAL INTERACTIONS

Social interactions between adults were limited. Lizard #4 died from injuries sustained in fights with lizard #1. This death was almost certainly due to inadvertently mixing animals from different colonies. No other fighting was observed but some injuries were sustained amongst the captive animals, consisting of scars across the back and the loss (followed by regeneration) of the tail in some cases. One animal also lost a digit. This suggests that occasional fights did take place, although some injuries, such as the loss of a tail-tip, could have been inadvertent when the animals were being fed. At least one of the wild-caught adults had a missing digit. When feeding, particularly on live food, adults would try to steal food from each other and would run away with food to avoid confrontations. On one occasion, lizard #5 (adult female) trembled when approached by lizard #1 (adult male). This was in February 2010 so was post-breeding.

Adults appeared less inclined to steal food from juveniles less than one year old than from other adults.

Interactions between adults and juveniles were more complex than interactions observed between adults and included clear agonistic behaviour. Juveniles in their first year of life and still displaying the contrasting bright orange body and dark cap employed posturing when approached by an adult, including when food was present. This involved raising and laterally compressing the body, particularly the fore-quarters, arching the neck and tilting the head to display the dark cap towards the approaching adult (see Figure 1). This appeared to appease the adult, which would otherwise be quite capable of stealing the food or even eating a young juvenile, although the young juveniles would also sometimes run away. The possible disappearance and presumed death and consumption of one neonate in January 2010 suggests that the appeasement display was not always successful, although this may have been an artefact of captive conditions and excessive colony size. Juveniles over a year old and in which the distinctive colouration had faded did occasionally attempt the posturing display when approached by an adult, but also ran away. Posturing was not observed in juveniles over two years of age.

In addition to the agonistic display, juveniles in their first year

of life would approach feeding adults and appeared to taste the food they were eating. While juveniles recognised live insects as food readily, they did not immediately recognise cat-food or finely-chopped apple as edible. By licking the food being eaten by an adult, they appeared to “learn” that this material was edible. This licking of food held by an adult did not involve theft of the food by the juvenile, and the adult did not try to avoid the contact as it would do if approached by another adult. The agonistic display was not used by juveniles approaching adults, only by juveniles when approached by an adult.

CONCLUSIONS

The social skink *Liopholis* “Cape Range” has distinctive early-juvenile colouration and behaviour that ensures young animals are accepted within the group, are able to feed amongst adults without themselves being eaten, and may also assist them in learning about novel foods. The behaviour emphasises the early-juvenile colouration and is used when the early-juvenile is approached by an adult. Such agonistic behaviour is well-documented among social mammals but is not well-recorded among the generally asocial reptiles. Brighter colouration among juvenile compared with adult specimens is common among

reptiles even in largely solitary species, but the juvenile *Liopholis* “Cape Range” are not simply brighter, but also have a distinctly dark cap that is presented to adults as part of the agonistic display. It is not known if such colouration and displays are found in other *Liopholis* species, or in other social species formerly assigned to *Egernia*.

The loss of the early-juvenile colouration and behaviour results in immature lizards (more than about a year old and certainly more than two years old) having to run from adults more often, and it may be at this stage that young lizards may move to the periphery of a colony and even disperse. Sexual maturity is reached in the third year of life and at least in captivity longevity is in excess of 11 years.

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